

# Trees and Hierarchy

Universität Wien, 050065 VU Visualization  
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Raphael Mitsch

# Trees and Hierarchy

- ✦ Challenge: Visualizing large hierarchical structures
- ✦ Paper I: Cone Trees - Animated 3D Visualization of hierarchical Information
- ✦ Paper II: Botanical Visualizations of Huge Hierarchies
- ✦ Critique & Comparison

# Cone Trees

Animated 3D Visualization of hierarchical Information

## ✧ Authors:

- George G. Robertson
- Jock D. Mackinlay
- Stuart K. Card

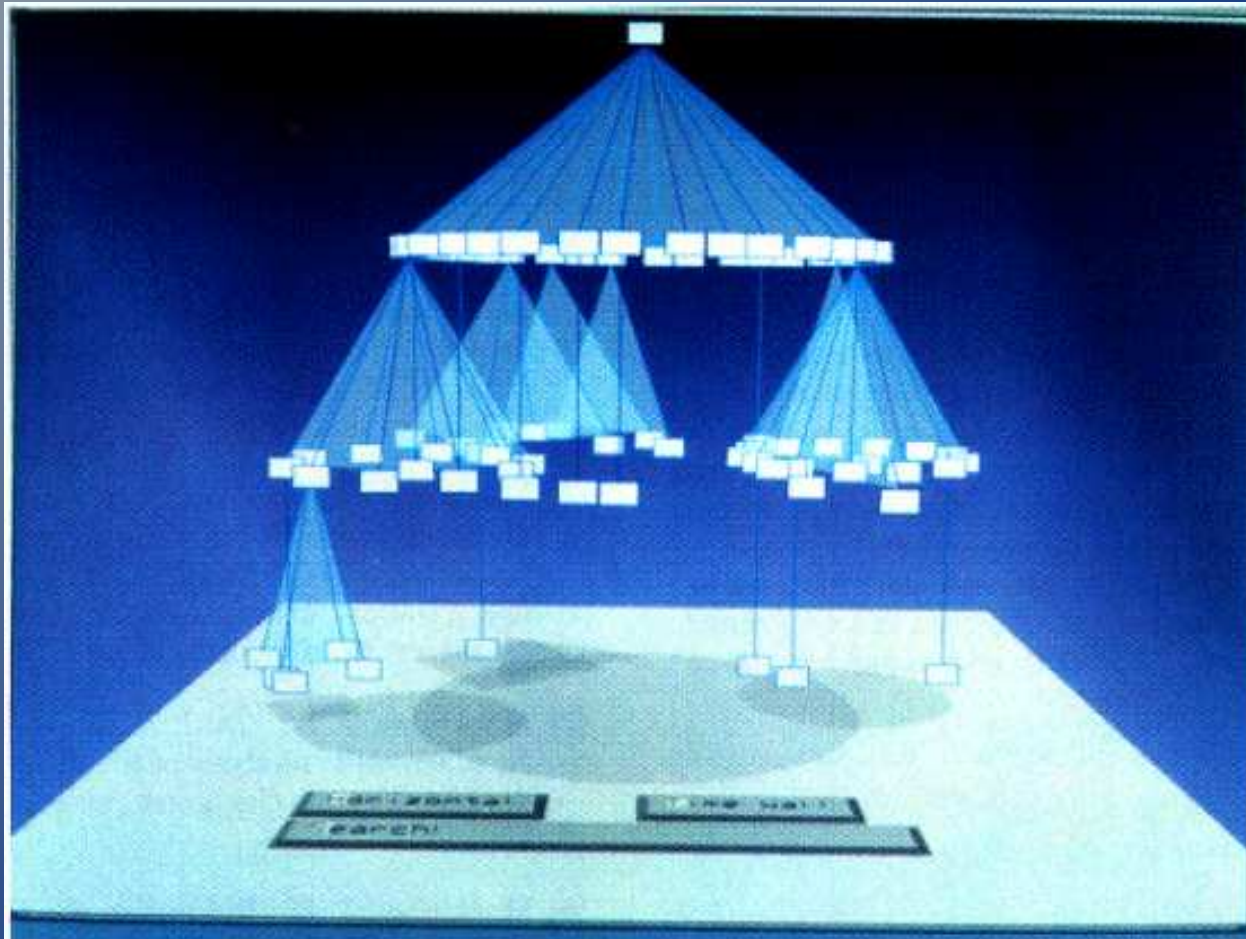
✧ Xerox research department

✧ Published 1991

# Cone Trees

- ✧ Approach:
  - 3D tree structure
  - Children arranged in cones
  - Interactive, animated
- ✧ Semi-opaque cones
- ✧ Dynamic cone size

# Cone Trees



Robertson Plate 1

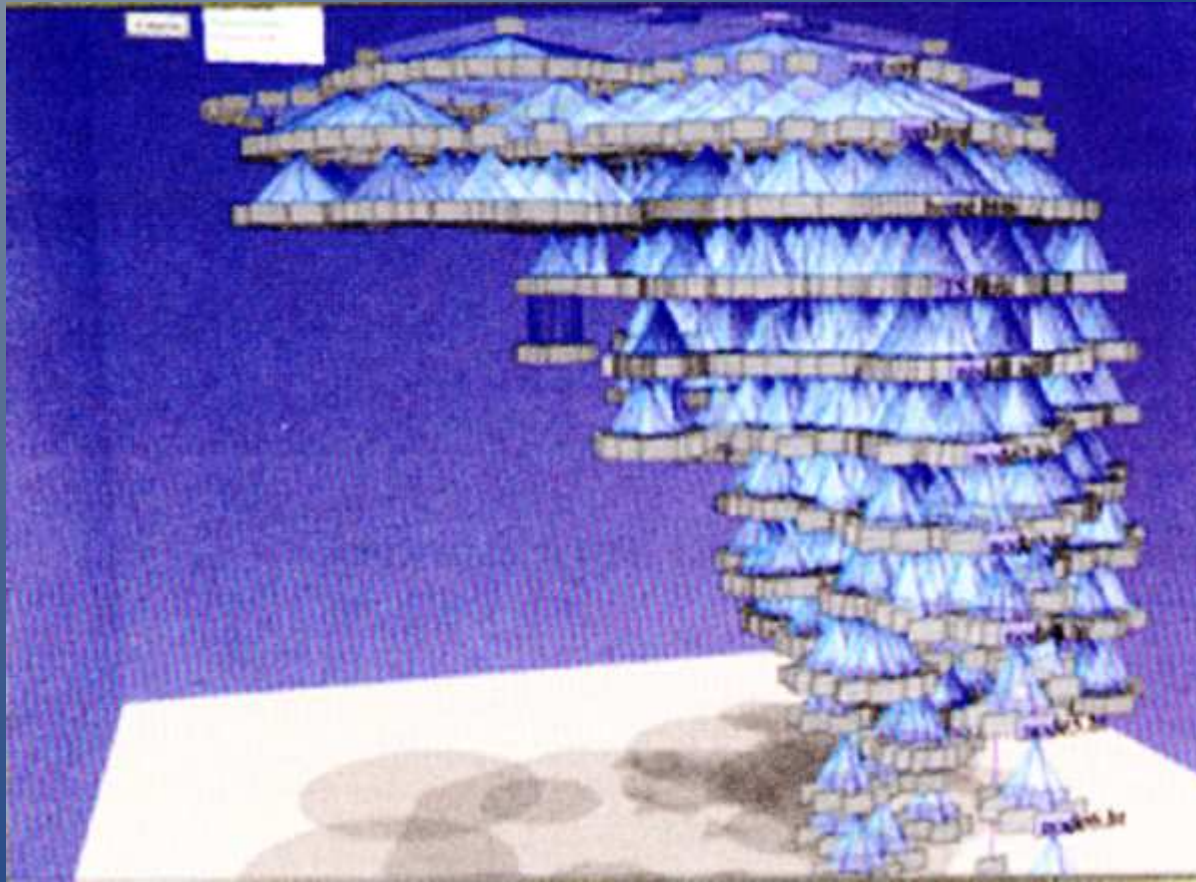
# Cone Trees

- Selected node (and parents) moved to front
- Horizontal / vertical alignment
- Animation to reduce cognitive load
- Fisheye view (selected path) available
- Text search

# Cone Trees

- ✦ „Gardening“ operations
  - Hiding descendants
  - Hide siblings
  - Move substructures
- ✦ Better with unbalanced trees
- ✦ Scalable to  $10^3$  nodes

# Cone Trees





# Botanical Visualization of Huge Hierarchies

## ✧ Authors:

- Ernst Kleiberg
- Huub van de Wetering
- Jarke J. van Wijk

## ✧ Eindhoven University of Technology

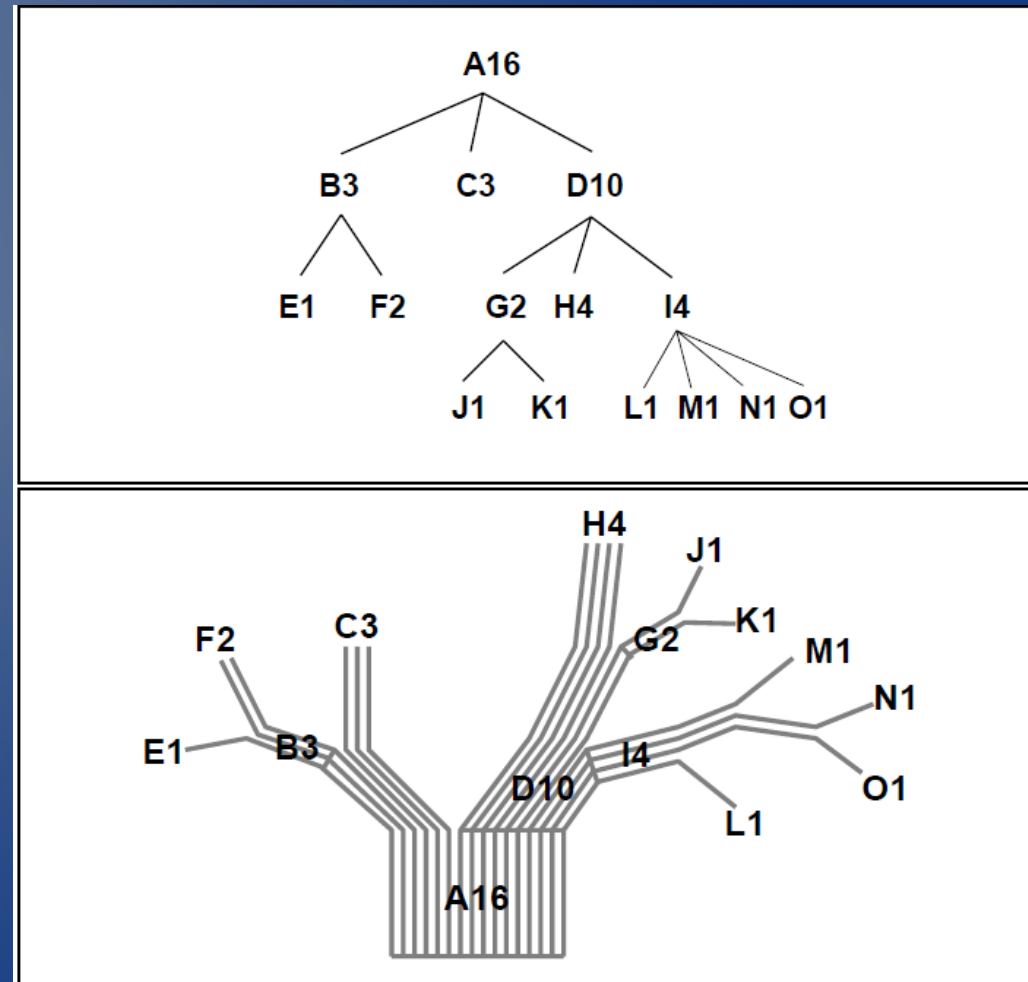
## ✧ Published 2001

# Botanical Visualization of Huge Hierarchies

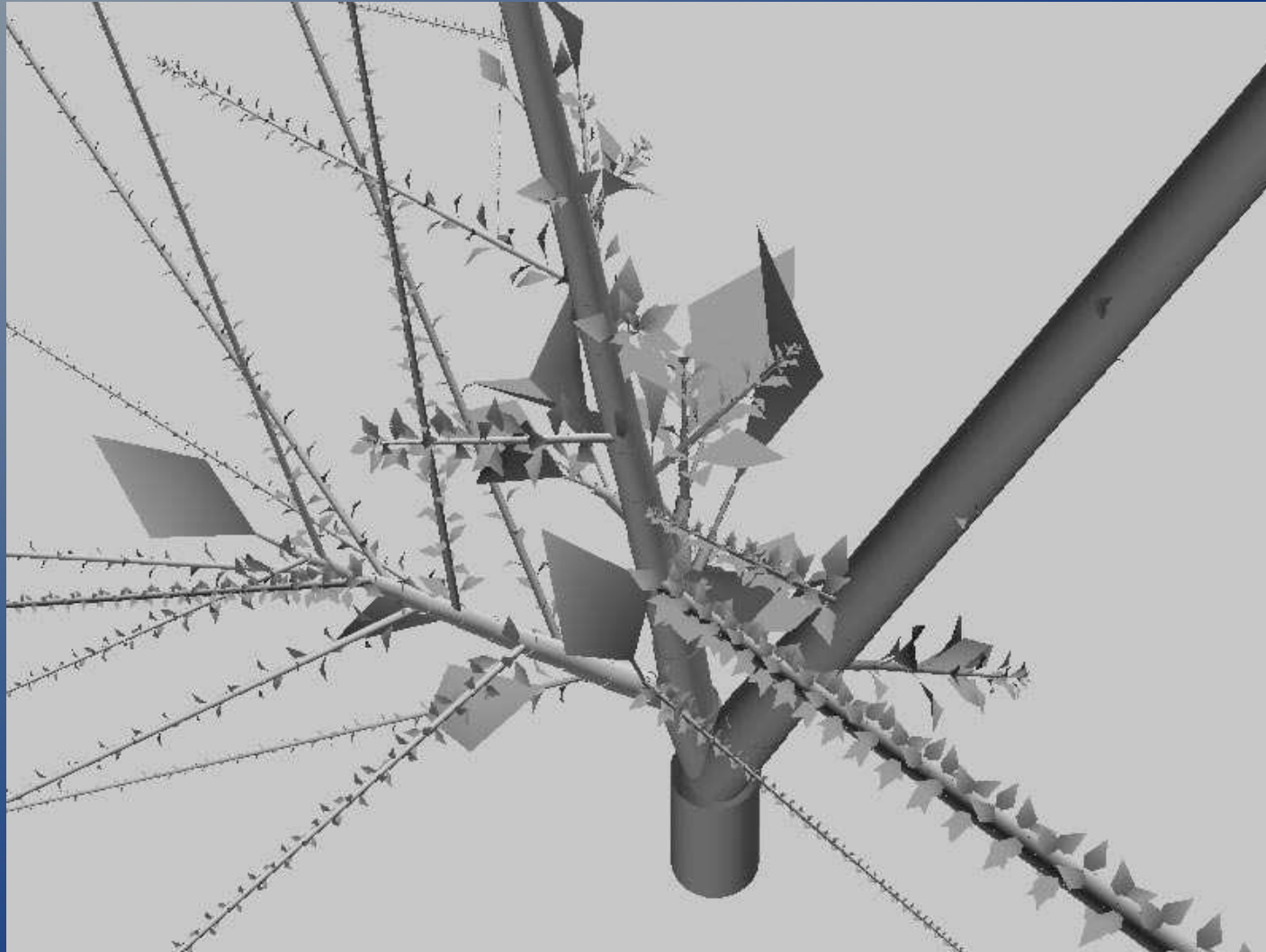
- ✦ Approach:
  - Analogy of abstract to real trees
  - Using input data to create geometric 3D tree model
- ✦ No manipulation by user
- ✦ 3D for more effective use of space
- ✦ Geometric plant/tree models: Plenty of algorithms

# Botanical Visualization of Huge Hierarchies

- Adaptions needed to create model out of input
- Based on Holton's strand model
- Takes file size into account



# Botanical Visualization of Huge Hierarchies

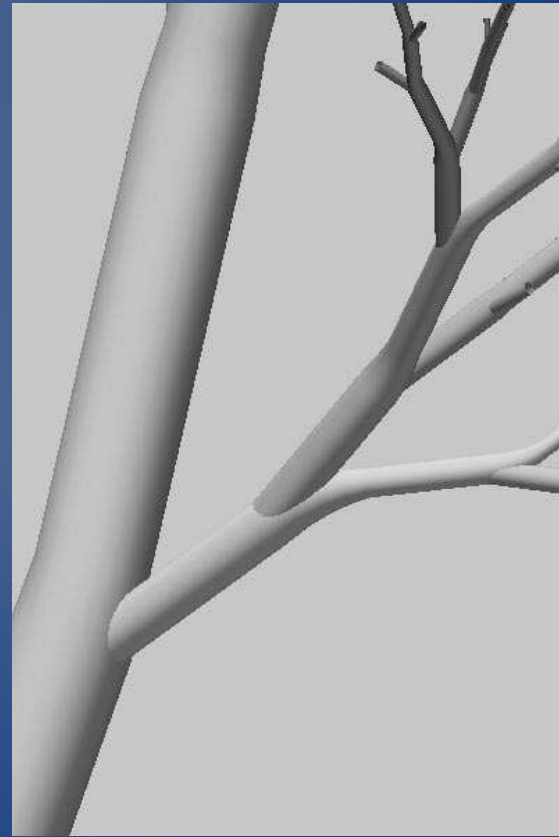
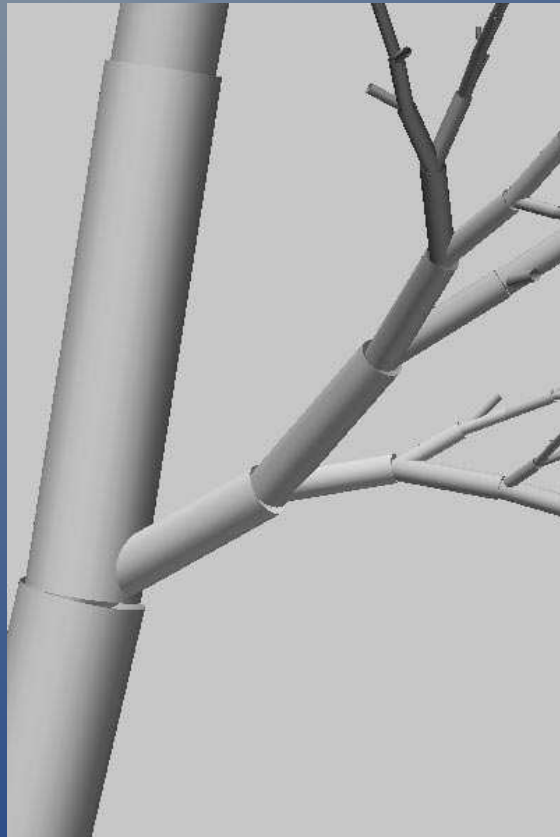


# Botanical Visualization of Huge Hierarchies

## ✦ Refinements

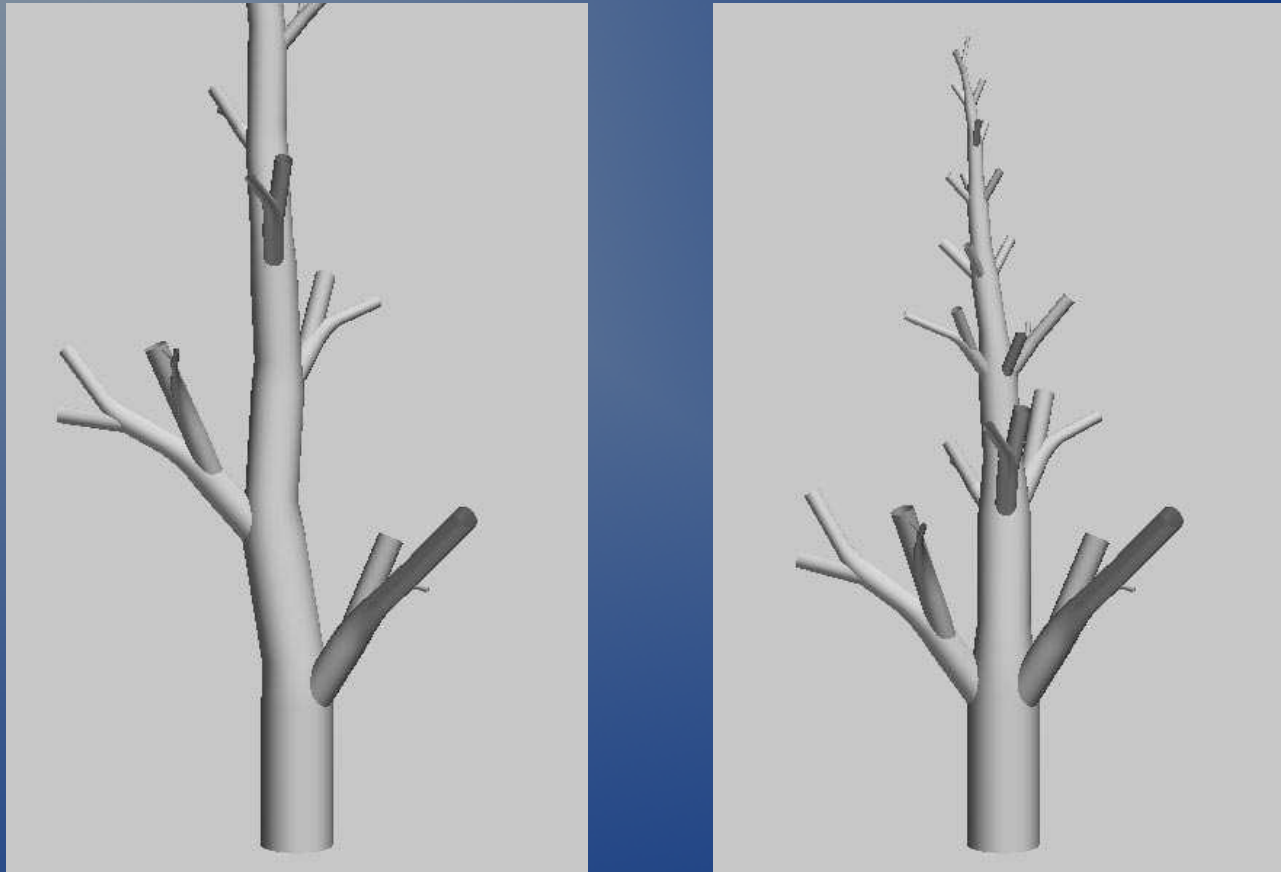
- Continuing branches
- Different branch colors for diff. hierarchy levels
- Contraction of long branches
- N-tree instead of binary tree
- Fruits instead of leaves (phi-balls)
- Ball color represents file type

# Botanical Visualization of Huge Hierarchies

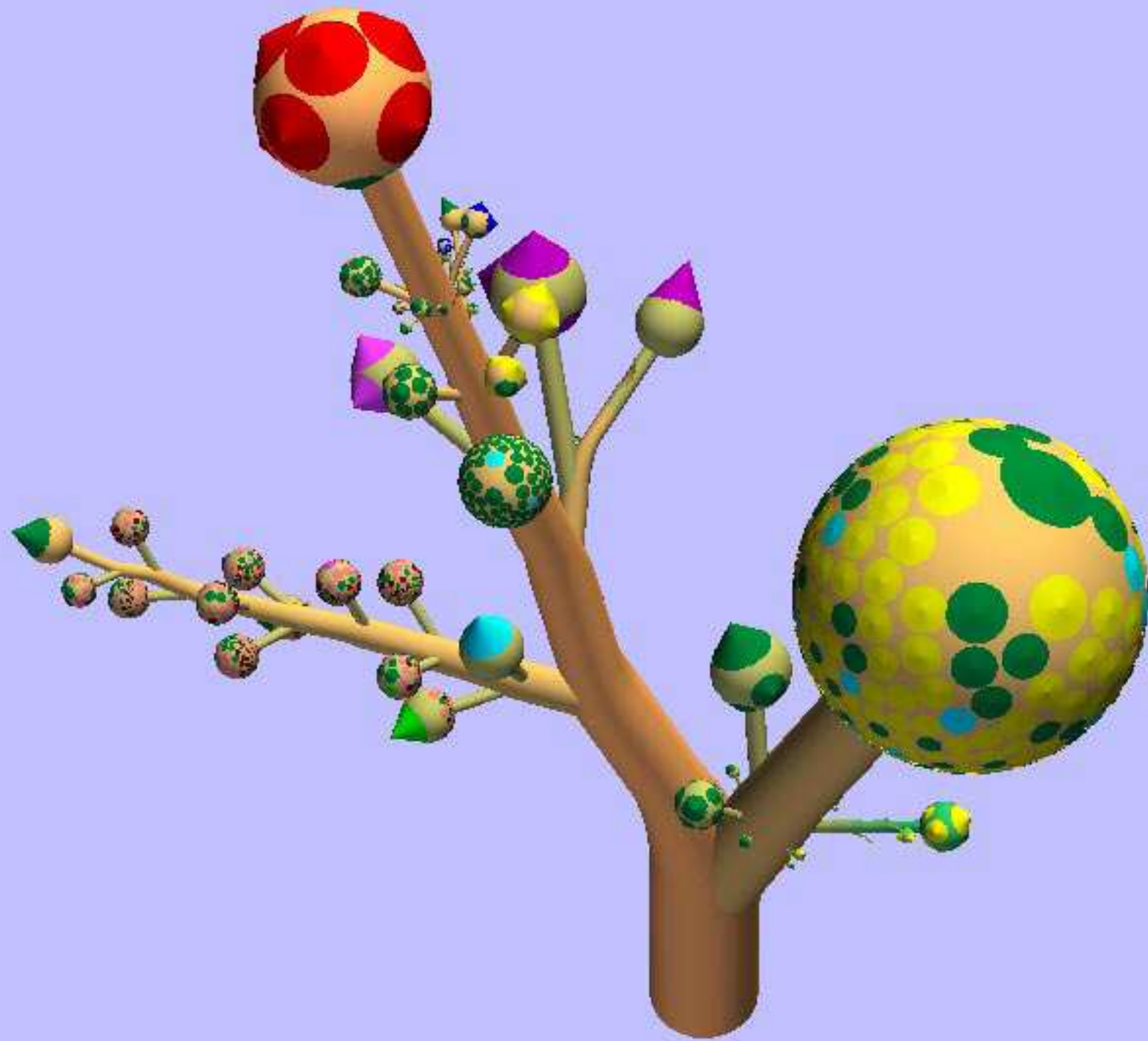


Continuing branches

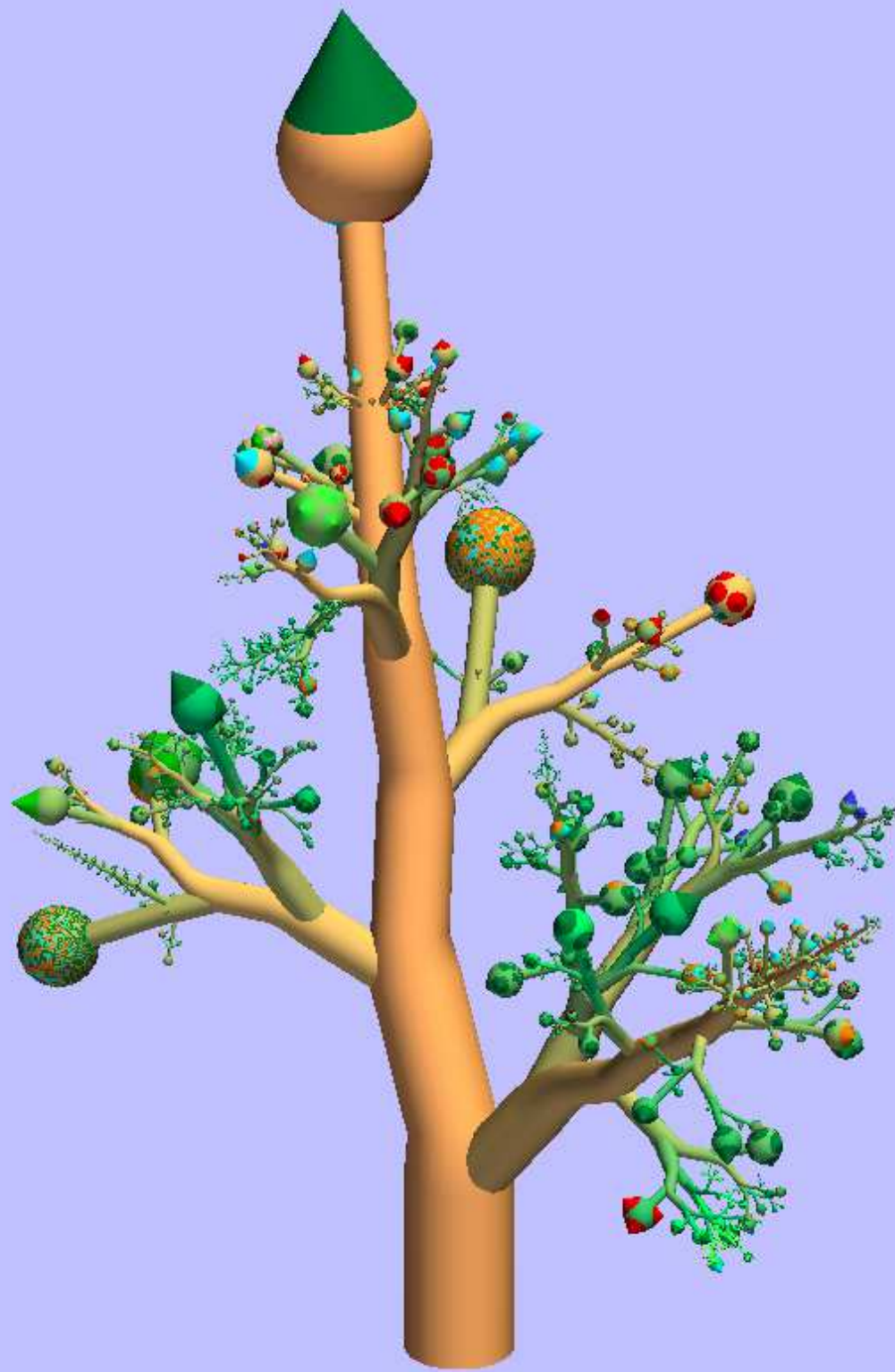
# Botanical Visualization of Huge Hierarchies

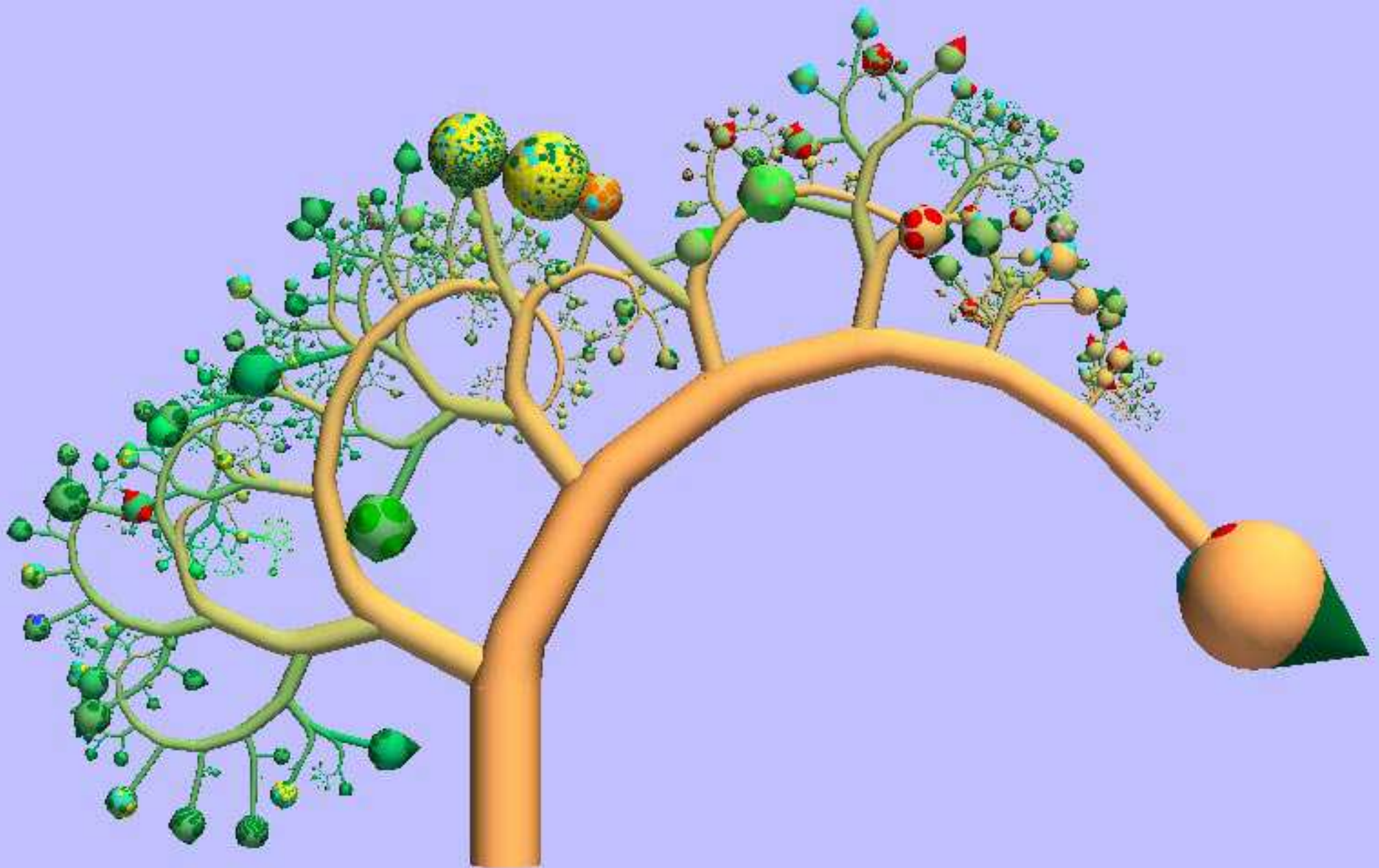


Contraction of long branches









# Critique & Comparison

## ✧ Cones

- Few technical details
- No user evaluation
- No example pictures for gardening operations or fisheye

## ✧ Botanical visualization

- Taking the analogy too far?
- Only sparse details about performance and user satisfaction („intrigued“ and „stimulated“)
- Algorithms provided